

in P.A. 11/173 LP

PCT

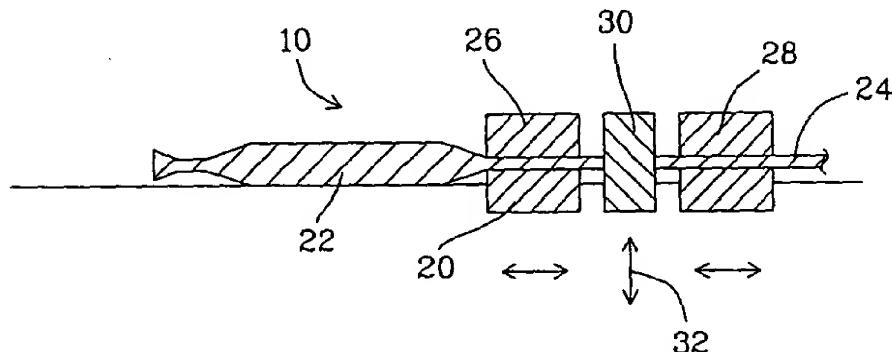
WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :  D21F 1/02	A1	(11) International Publication Number: WO 98/51856  (43) International Publication Date: 19 November 1998 (19.11.98)
(21) International Application Number: PCT/US98/05663		(81) Designated States: CA, DE, FI, GB, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
(22) International Filing Date: 20 March 1998 (20.03.98)		
(30) Priority Data: 08/854,605 12 May 1997 (12.05.97) US		Published <i>With international search report.</i>
(71) Applicant: BELOIT TECHNOLOGIES, INC. (US/US); Suite 3001, 3513 Concord Pike, Wilmington, DE 19803 (US).		
(72) Inventors: NEILL, Eugene, B.; 5973 Hugh Drive, So. Beloit, IL 61080 (US). RYAN, Mark, A.; 4438 East County J, Beloit, WI 53511 (US).		
(74) Agent: ARCHER, David, A.; Beloit Corporation, One St. Lawrence Avenue, Beloit, WI 53511 (US).		

(54) Title: A TRAILING ELEMENT DEVICE



(57) Abstract

A trailing element device is disclosed for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber (12) of a headbox of a papermaking machine. The device includes an upstream member (14), the upstream member including a locking portion (16) for locking the upstream member (14) relative to an upstream end (18) of the slice chamber. The upstream member (14) also includes a downstream portion (20) disposed within the slice chamber and downstream relative to the locking portion. An intermediate portion is disposed between the locking portion and the downstream portion (22) and a downstream member (24) is disposed downstream relative to the downstream portion (22). The downstream member (24) is fusion welded to the downstream portion (22).

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Larvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

**TITLE: A TRAILING ELEMENT DEVICE**

**BACKGROUND OF THE INVENTION**

**Field of the Invention**

The present invention relates to a trailing element device for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber. More specifically, the present invention relates to a trailing element device for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber of a headbox of a papermaking machine.

**Information Disclosure Statement**

In the papermaking art pressurized stock is ejected from a headbox onto a moving fourdrinier wire so that as water is drained from the stock through the fourdrinier wire, a web of paper is formed on the wire.

In order to control the magnitude and scale of turbulence of the stock flowing through the headbox and particularly the slice chamber thereof, trailing elements or CONVERFLO sheets are anchored at the upstream end of the slice chamber. The arrangement is such that as the stock flows through the slice chamber, the trailing elements are freely suspended within the stock flow being anchored only at the upstream end thereof.

The aforementioned trailing elements are known in the art as CONVERFLO sheets. CONVERFLO is a common law trademark of Beloit Technologies, Inc.

Typically, the trailing elements are fabricated from Lexan sheets and the Lexan sheets are bonded together to form a composite sheet by means of chemical bonding agents. One type of bonding agent or solvent used for joining the Lexan sheets together is methylene chloride. However, methylene chloride is known to be a carcinogen. Consequently, it is desirable to eliminate the use of the aforementioned bonding agents.

Moreover, although the use of methylene chloride has been successful in providing an adequate bonding between the respective Lexan sheets, it has been observed that after a period of a few years, the methylene chloride tends to corrode the Lexan sheet leading to early failure thereof.

Additionally, the various chemicals within the paper stock flow itself have a detrimental effect on the known bonding solvents.

Also, from time to time, a mill will have a scheduled "boil out" in order to clean the headbox.

The aforementioned "boil out" includes filling the headbox including the slice chamber with a caustic cleaning liquid maintained at approximately 140°F for several hours. Typically, the caustic solution has a pH value of at least 13.

Consequently, it has been standard practice for mills to remove the Lexan sheets prior to performing the aforementioned "boil out" operation.

In view of the fact that the removal of the Lexan sheets typically takes one hour and the replacement of the sheets after the "boil out" also involves an hours work, it is evident that the provision of CONVERFLO or

trailing element sheets capable of withstanding a cleaning operation would be of great value.

Although graphite sheets are known to be able to withstand the hostile environment within a slice chamber during a "boil out" operation, such graphite sheets typically cost 10 times as much as the corresponding Lexan sheets.

The present invention overcomes the aforementioned problem by the provision of thermoplastic sheets which are fusion welded together and that are consequently able to withstand the caustic environment involved in a headbox cleaning operation. Also, the thermoplastic sheets are only marginally more expensive than their corresponding sheets fabricated from Lexan.

Therefore, it is the primary objective of the present invention to provide a trailing element device that overcomes the problems associated with prior art trailing elements and which makes a considerable contribution to the art of papermaking.

Another objective of the present invention is the provision of a trailing element device that does not require the use of methylene chloride, a known carcinogen, in the manufacture thereof.

Another objective of the present invention is the provision of a trailing element that is able to withstand the high temperatures and caustic environment typically present during a headbox cleaning operation.

Other objects and advantages of the present invention will be readily apparent to those skilled in the art by a consideration of the detailed

description contained hereinafter taking in conjunction with the annexed drawings.

#### SUMMARY OF THE INVENTION

The present invention relates to a trailing element device for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber of a headbox of a papermaking machine.

The device includes an upstream member. The upstream member incorporates a locking portion for locking the upstream member relative to an upstream end of the slice chamber.

The upstream member also includes a downstream portion disposed within the slice chamber and downstream relative to locking portion.

An intermediate portion is disposed between the locking portion and the downstream portion.

A downstream member is disposed downstream relative to the downstream portion. The downstream member is fusion welded to the downstream portion.

More particularly, in specific embodiments of the present invention, the upstream and downstream members are of thermoplastic material.

In a specific embodiment of the present invention, the thermoplastic material is either KYNAR 740 or KYNAR 741.

In a preferred embodiment of the present invention, the intermediate portion has a z-direction thickness which is greater than a z-direction thickness of the downstream portion.

Many variations and modifications of the present invention will be readily apparent to those skilled in the art by consideration of the detailed description contained hereinafter taken in conjunction with the annexed drawings. However, such modifications and variations fall within the spirit and scope of the present invention as defined by the appended claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side elevational view showing a portion of a trailing element according to the present invention.

Fig. 2 is a side elevational view showing how the trailing element according to the present invention is fusion welded.

Similar reference characters refer to similar parts throughout the various views of the drawings.

#### DETAILED DESCRIPTION OF DRAWINGS

Figures 1 and 2 are side elevational views of a trailing element device 10 for controlling the magnitude and the scale of turbulence of stocks flowing through a slice chamber 12 of a headbox of a papermaking machine. The device includes an upstream member generally designated 14.

The upstream member 14 includes a locking portion 16 for locking the upstream member 14 relative to an upstream end 18 of the slice chamber 12.

A downstream portion 20 is disposed within the slice chamber 12 and downstream relative to the locking portion 16.

An intermediate portion 22 is disposed between the locking portion 16 and the downstream portion 20.

Also, a downstream member 24 is disposed downstream relative to the downstream portion 20. The downstream member 24 is fusion welded to the downstream portion 20.

More specifically, the upstream and the downstream members 14 & 24 are of thermoplastic material which may be either KYNAR 740 or KYNAR 741.

As shown in Figs. 1 and 2, the intermediate portion 22 has a z-directional thickness T which is greater than a z-direction thickness T1 of the downstream portion 20.

Fig. 2 shows how the downstream member 24 and the downstream portion 20 are fusion welded together. More specifically, clamps 26 and 28 are disposed adjacent to the downstream member 24 and the downstream portion 20 respectively.

The gripped downstream member 24 and the downstream portion 20 are pushed under pressure against a heated bar 30.

Once heated, the heated bar 30 is lowered as indicated by the arrow 32 and the pieces 20 & 24 are pushed together under high pressure. In order to provide heat for the welding process, the heated bar 30 is then

raised as indicated by arrow 32 to just below the weld area until the weld process is completed.

The weld process is adjustable to optimize the results by varying the heat, the pressure and the weld time. The aforementioned parameters are then controlled using a computer in a closed loop feedback mode.

Moreover, the welding equipment is designed with an open throat which allows unlimited lengths of the parts to be processed.

The present invention provides a unique low cost trailing element device which is capable of withstanding high temperatures and the caustic environment associated with a headbox cleaning operation.

WHAT IS CLAIMED IS:

1. A trailing element device for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber of a headbox of a papermaking machine, said device comprising:
  - an upstream member;
  - said upstream member including:
    - a locking portion for locking said upstream member relative to an upstream end of the slice chamber;
    - a downstream portion disposed within the slice chamber and downstream relative to said locking portion;
    - an intermediate portion disposed between said locking portion and said downstream portion; and
    - a downstream member disposed downstream relative to said downstream portion, said downstream member being fusion welded to said downstream portion.
2. A trailing element device as set forth in claim 1 wherein:  
said upstream and downstream members are of thermoplastic material.
3. A trailing element device as set forth in claim 2 wherein said thermoplastic material is KYNAR.
4. A trailing element device as set forth in claim 2 wherein said thermoplastic material is KYNAR 740.
5. A trailing element device as set forth in claim 2 wherein said thermoplastic material is KYNAR 741.

6. A trailing element device as set forth in claim 1 wherein said intermediate portion has a z-direction thickness which is greater than a z-direction thickness of said downstream portion.

1/1

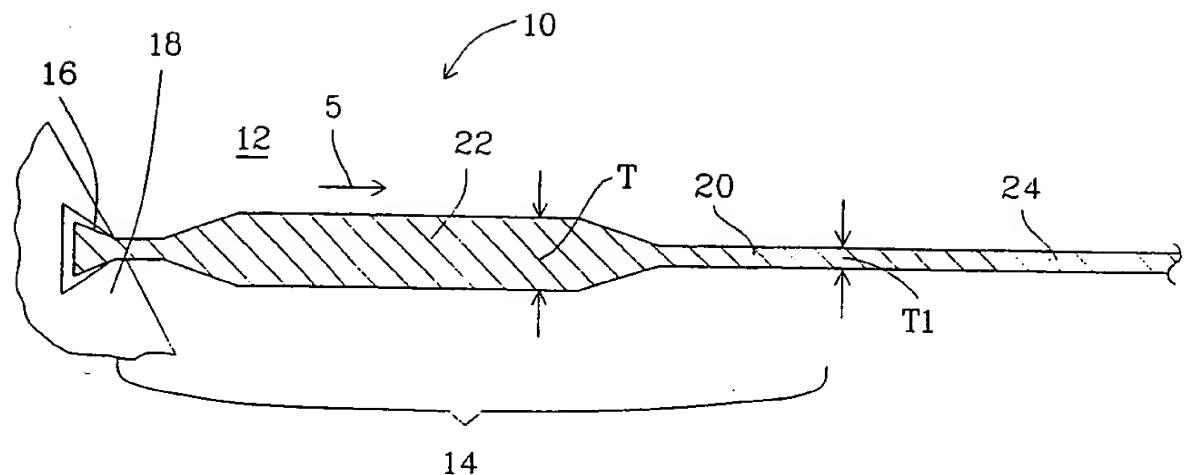


Fig. 1

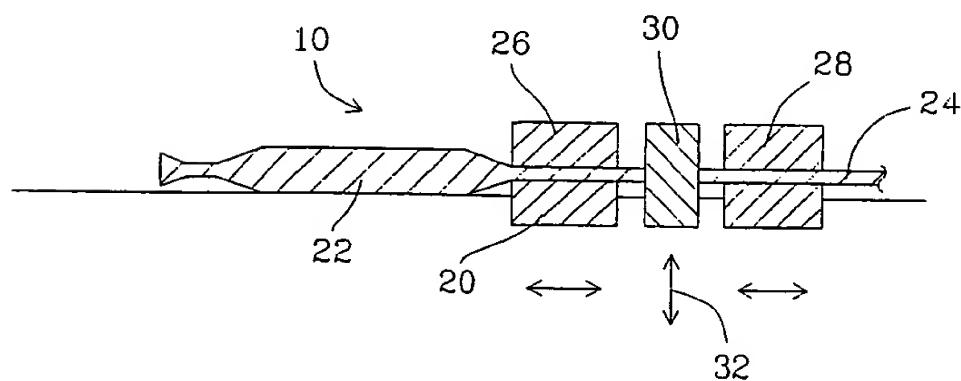


Fig. 2

# INTERNATIONAL SEARCH REPORT

In International Application No  
PCT/US 98/05663

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 D21F1/02

According to International Patent Classification(IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 D21F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 205 603 A (DIXON ET AL.) 31 May 1974 see page 6, line 7 - line 12; figures 2-4	1,2,6
A	US 3 853 697 A (PARKER J ET AL) 10 December 1974	
A	EP 0 681 057 A (VOITH SULZER PAPIERMASCH GMBH) 8 November 1995	
A	EP 0 147 350 A (BELOIT CORP) 3 July 1985	
A	US 5 545 294 A (LINDEN ANDERS TOMMY ET AL) 13 August 1996	
A	US 4 812 209 A (KINZLER GERNOT ET AL) 14 March 1989	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"S" document member of the same patent family

Date of the actual completion of the international search

7 July 1998

Date of mailing of the international search report

16/07/1998

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patenttaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
Fax: (+31-70) 340-3016

Authorized officer

DIAZ-MAROTO, V

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No	
PCT/US 98/05663	

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2205603	A 31-05-1974	US 3888729 A AR 199318 A BE 806590 A CA 980156 A CH 576554 A DE 2354426 A GB 1443540 A NL 7314912 A,B SE 403917 B ZA 7308504 A	10-06-1975 23-08-1974 15-02-1974 23-12-1975 15-06-1976 30-05-1974 21-07-1976 08-05-1974 11-09-1978 25-09-1974
US 3853697	A 10-12-1974	CA 1009486 A GB 1456573 A JP 906087 C JP 49124306 A JP 52033202 B	03-05-1977 24-11-1976 18-04-1978 28-11-1974 26-08-1977
EP 0681057	A 08-11-1995	NONE	
EP 0147350	A 03-07-1985	AU 570746 B AU 3564284 A BR 8405925 A CA 1230251 A FI 844059 A,B IN 162165 A JP 1381540 C JP 60134093 A JP 61046597 B US 4617091 A	24-03-1988 30-05-1985 10-09-1985 15-12-1987 26-05-1985 09-04-1988 09-06-1987 17-07-1985 15-10-1986 14-10-1986
US 5545294	A 13-08-1996	SE 501798 C AT 163454 T DE 69408680 D EP 0719360 A JP 9502773 T SE 9302980 A WO 9508023 A	15-05-1995 15-03-1998 02-04-1998 03-07-1996 18-03-1997 14-03-1995 23-03-1995
US 4812209	A 14-03-1989	DE 3607306 A AT 388580 B	10-09-1987 25-07-1989

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 98/05663

Patent document cited in search report	Publication date	Patent family member(s),	Publication date
US 4812209 A		CA 1272054 A FI 870738 A,B FR 2595382 A GB 2187485 A,B JP 62215087 A SE 466460 B SE 8700839 A	31-07-1990 07-09-1987 11-09-1987 09-09-1987 21-09-1987 17-02-1992 07-09-1987